

REMARKS

I. PENDING CLAIMS AND SUPPORT FOR AMENDMENTS

Upon entry of this amendment, claims 1-13 and 15-17 will be pending in this application. Claim 17 is supported by originally filed claims 1, 10, 12, and 13. Accordingly, its entry does not raise the issue of new matter or raise new issues requiring further consideration or search, and so should be entered under 37 C.F.R. § 1.116.

II. ANTICIPATION REJECTION

In paragraph 2 of the Office action, the Examiner again rejects claims 1-10 and 14-16 as anticipated under 35 U.S.C. § 102(e) by Yang et al. (U.S. Patent No. 6,036,726). Applicant respectfully traverses this rejection and request reconsideration and withdrawal thereof.

Applicant respectfully submits that the Examiner appears to have misperceived the nature of the pressure increase recited in Applicant's claims. In the claimed process, contact of the nylon-containing material with the alkanol-containing solvent occurs not merely at elevated temperature and pressure. As indicated in the claims, the pressure is higher than the equilibrium pressure of the solvent at the elevated temperature. Put another way, the pressure at which dissolution occurs is higher than the vapor pressure of the solvent at the extraction temperature. This can only be accomplished by providing the system with a source of pressure external to the solvent liquid-vapor equilibrium, such as introducing sufficient quantity of inert gas into the system, or to increase the head pressure of the liquid flowing into the system.

Yang et al. does not teach that the pressure used in their process should be above the equilibrium pressure of the solvent at the contacting temperature. There is no indication in Yang et al. that any source of pressure external to the vapor-liquid equilibrium of the solvent. Yang et al. does not describe including an inert gas to increase pressure, nor do they suggest any process equipment that would increase the head pressure of the mixture to a level above the equilibrium vapor pressure of the solvent.

The Examiner's comments in the previous Office action and in the most recent Office action indicate that she has not fully appreciated this distinction. As Applicant has indicated at page 5, lines 12-28, by operating at a temperature above the equilibrium vapor pressure of the solvent system (rather than simply at the vapor pressure of the solvent, as taught in Yang et al.), the dissolution process can be operated at a temperature that is lower than would be necessary if the pressure was simply the vapor pressure of solvent. This results in decreased degradation of the fiber. Maintaining the fibers molecular weight is important in providing recovered nylon that has not been downgraded (i.e., that can be respun into fiber again, rather than used in molding or other lower valued uses).

In paragraph 8 a) of the Office action, the Examiner states that:

[T]he independent claim of the present invention calls for equilibrium pressure without any specific numerical ranges and at elevated temperature so that the solvent can dissolve the nylon. The prior art of Yang teaches dissolving nylon at 140 °C, which is elevated temperature and according to examples at a pressure of 250 psig, which is elevated pressure, and such pressure and temperature combination is high enough to dissolve nylon.

This is incorrect. First, Applicant specifically excludes equilibrium vapor pressure of the solvent at the dissolution temperature by specifying that the dissolution occurs at a pressure higher than the equilibrium vapor pressure at that temperature. Second, the Examiner is picking and choosing from different portions of the Yang et al. disclosure to reconstruct what she perceives to be Applicant's invention. Randomly combining temperatures and pressures from Yang et al. does not result in an anticipation of Applicant's claims. That a pressure of 250 psig may be exemplified (and may even be considered "elevated" with respect to atmospheric pressure) does not establish an anticipation because there is no indication in Yang et al. that such a pressure is above the equilibrium vapor pressure of the solvent system used at the temperature of the dissolution. Since there is no provision for application of external pressure taught or suggested in Yang et al., it seems most reasonable to assume that the exemplified pressure is not above the equilibrium vapor pressure, rather than to assume that it is.

Both Yang et al. and the Examiner appear to admit this point; in paragraph 8 c), of the Office action, the Examiner states:

[T]he column and line number that the applicant has referred the examiner to simply states that the pressures utilized in the process will vary with the solvents. This makes sense, since different solvents have different boiling points and so on. It does not say anything about pressure being lower than the vapor pressure of the solvent.

Applicant does not argue that the Yang et al. disclosure requires that the pressures used to decolorize be below the vapor pressure of the solvent; neither is such a construction of the Yang et al. disclosure necessary to avoid anticipation. Applicant's argument is that the disclosure of Yang et al. necessarily results in a process where

the decolorization pressure is at the equilibrium vapor pressure of the solvent.

Applicant's claims clearly recite that the dissolution pressure used in his process is above the equilibrium pressure of the solvent, not at or below it.

Absent some teaching of this element of Applicant's claims, Applicant respectfully submits that the Examiner has failed to establish an anticipation by Yang et al., and that this rejection should be withdrawn.

With respect to paragraph 8 e), Applicant is well aware of the distinctions between anticipation and obviousness. Apparently, the Examiner failed to notice that all arguments concerning lack of a *prima facie* case of obviousness were contained in the sections of Applicant's response dealing with the Examiner's obviousness rejections, not in the section dealing with the Examiner's anticipation rejection.

III. OBVIOUSNESS REJECTIONS

A. Yang et al. in view of Meyer et al.

In paragraph 5 of the Office action, the Examiner has rejected claims 10 and 11 under 35 U.S.C. § 103(a) as obvious over Yang et al. in view of Meyer et al. (U.S. Patent No. 4,334,056). Applicant respectfully traverses this rejection and requests reconsideration and withdrawal thereof.

The differences between Yang et al. and the claimed method have been noted above and in Applicant's response to the previous Office action. As Applicant has previously pointed out, Meyer et al. fails to cure the deficiencies of Yang et al. Neither reference teaches or suggests operating at pressures above the equilibrium vapor pressure of the solvent at the dissolution temperature. Neither reference teaches or suggests that doing so would result in the ability to proceed at a lower

dissolution temperature than an equilibrium pressure process. Moreover, given the radically different uses to which Yang et al. and Meyer et al. put the nylons recovered from their processes, a worker of ordinary skill in this art would not have been motivated to combine their teachings. In fact, a worker of ordinary skill in this art would be motivated to avoid using recycled nylon for the uses disclosed in Meyer et al. for the reasons described in Applicant's previous response. For any of these reasons alone, the Examiner has failed to establish a *prima facie* case of obviousness, and should withdraw this rejection.

In addition to allowing the process to proceed at lower temperatures, Applicant's invention also achieves advantages not taught or suggested by either Yang et al. or Meyer et al. Rather than degrade the molecular weight of the nylon recovered thereby, Applicant's claimed process actually enhances the properties of the nylon, in many cases giving the nylon a tenacity better than that obtained with virgin material. As described at pages 5-6 of the specification, low molecular weight nylon, resulting from degradation of the nylon fibers in use, remains in solution, along with plasticizers, lubricants, coating materials, and the like. The high molecular weight nylon precipitates well before these other materials, providing a recycled nylon product with a better molecular weight distribution and better tenacity (when spun into fibers) than is obtained with many virgin nylons sold for spinning into fiber.

Moreover, the lower dissolution temperatures made possible by the use of pressure greater than the equilibrium vapor pressure of the solvent are the temperatures recited in claims 10 and 11. As Applicant has previously pointed out, Meyer et al. is directed to providing polyamide powder coatings for metal substrates.

There is no recognition in either Yang et al. or Meyer et al. that operation at pressures above the equilibrium pressure of the solvent system allows the lower temperature dissolution process to function effectively to dissolve the high molecular weight materials necessary to have a fiberizable product. There is no suggestion in Meyer et al. that the polyamide made from their process would be of suitable quality for processing into fiber, or would have a desirable molecular weight distribution for fiberization. In fact, as Applicants have previously pointed out, the C10 polyamides of Meyer et al. would not have the crystallinity necessary to produce effective fiber.

Thus, even if the reference teachings were properly combinable, one of ordinary skill in the art would either increase the dissolution temperature to that disclosed in Yang et al. or would expect only low molecular weight nylons to dissolve and be recovered at the lower dissolution temperatures disclosed by Meyer et al. There is no motivation in either reference to combine a dissolution pressure above the equilibrium pressure of the solvent system with a low dissolution temperature with any expectation of obtaining high molecular weight, fiberizable nylons.

In paragraph 8 f), the Examiner asserts that “the reasons why the examiner combines the prior art of record does not have to be the reasons applicant’s reasons.” The Examiner should note that this is not Applicant’s argument. Applicant’s arguments are that the references are not properly combinable for any reason, because there is no teaching or motivation that the temperature ranges in Meyer et al. will produce acceptable results in the process of Yang et al.; that the C10 nylon used in Meyer et al. is fundamentally different from that in Yang et al., particularly with regard to properties necessary to form fiberizable materials; that while the motivation

alleged by the Examiner may be different from that of Applicant in making his invention, there must be some motivation that comes from the references and is consistent with their teachings, and not cut from whole cloth based on a hindsight reconstruction of the invention using the claims as a template.

For the reasons given above, Applicant respectfully submits that the Examiner's obviousness rejection should be withdrawn.

B. Yang et al. in view of Booij et al.

In paragraph 6 of the Office action, the Examiner has rejected claims 10 and 11 as obvious over Booij et al. (U.S. Patent No. 5,840,773). Applicant respectfully traverses this rejection and requests reconsideration and withdrawal thereof.

Again, and as explained in the previous response, Booij et al. does not cure the deficiencies of Yang et al. noted above because Booij et al. does not teach operating at a pressure above the equilibrium pressure of the solvent system at the dissolution temperature. To the contrary, Booij et al. teach away from Applicant's claims by disclosing that the pressure can be the vapor pressure of the solvent at the extraction temperature. In this respect, Booij et al. adds nothing to the disclosure of Yang et al. Contrary to the Examiner's statements in paragraph 8 h), Yang et al. does indeed contain deficiencies in that it completely fails to teach the use of pressures above the equilibrium pressure of the solvent system at the dissolution temperature. Booij et al. fails to address this deficiency. Thus, irrespective of the additional limitations introduced by claims 10 and 11, they are not obvious because the claim from which they depend is not obvious.

However, neither Yang et al. nor Booi et al. teach or suggest the additional limitations recited in claims 10 and 11, namely that high molecular weight, fiberizable recycled nylon can be obtained using dissolution temperatures as low as those recited in these claims by increasing the dissolution pressure above the equilibrium pressure of the solvent mixture. As a result, these claims are not obvious for reasons over and above those applicable to claim 1.

C. Yang et al. in view of Stott et al.

In paragraph 7 of the Office action, the Examiner has rejected claims 12 and 13 as obvious under 35 U.S.C. § 103(a) over Yang et al. in view of Stott et al. (U.S. Patent No. 2,742,440). Applicant respectfully traverses this rejection and requests reconsideration and withdrawal thereof.

In addressing the rejections above and in the response to the previous Office action, Applicant has argued that the claimed process, by using a dissolution pressure higher than the equilibrium pressure, allows:

- The use of a lower dissolution temperature than equilibrium pressure products;
- The use of a shorter dissolution time than equilibrium pressure products;
- The production of higher molecular weight recycled nylon suitable for fiberization, which is not obtainable with equilibrium pressure products;
- The claimed process is more suitable to continuous processing than is an equilibrium pressure process;
- The claimed process provides more efficient separation of nylon from other floor covering components than an equilibrium pressure process; and

- The claimed process provides nylon that is better suited to fiberization than many virgin nylons.

The Examiner has dismissed each of these arguments using the rationale that “they are not recited in the claims, so they do not matter.” However, as the Examiner is no doubt aware, the so-called “secondary” indicia of nonobviousness are always relevant in the obviousness determination. Moreover, the common factor in each of these advantages is that they occur with processes where the dissolution pressure is higher than the equilibrium pressure of the solvent at the dissolution temperature, and do not occur when an equilibrium pressure is used. This limitation is explicitly recited in Applicant’s claims, and, as explained above, is a limitation that distinguishes the claims from the process of Yang et al. Given that this limitation represents a difference and an advance over the primary piece of cited art, the advantages that it provides are strong evidence of nonobviousness, and should be considered by the Examiner in reassessing her obviousness position in light of Applicant’s response. It is not necessary that each of these advantages be recited in the claims, since they occur when a limitation that is recited in the claims (higher than equilibrium dissolution pressure) is practiced.

Certainly, neither Yang et al. nor Stott et al. make any reference to the advantages obtained when a dissolution pressure is used that is higher than the equilibrium pressure of the solvent. Neither reference explicitly teach the use of such a pressure to dissolve nylon. As a result, there is (1) a difference between the reference teachings and the cited art that (2) provides numerous significant

advantages that are untaught and thus unexpected. This is clear evidence of the nonobviousness of the invention.


CONCLUSION

In summary, Applicant's claimed process differs from that of Yang et al. in a significant way: the claims recite conducting dissolution at a pressure above the equilibrium pressure for the solvent at the dissolution temperature, while Yang et al. and the other cited references all disclose using an equilibrium pressure process. This difference allows Applicant's process to provide significant and substantial improvements in process efficiency and product properties, resulting in an economical process that efficiently recycles nylon and provides a product that has not been downcycled, i.e., that can be reused as fiber, often with better properties than fiber obtained from virgin nylon. As a result, the claimed process is not only novel, but is not obvious over any of the cited art of record.

Applicant respectfully submits that the claims are in condition for immediate allowance, and an early notification to that effect is earnestly solicited. If the Examiner believes that further issues remain to be resolved, she is respectfully requested to contact the undersigned to arrange an interview prior to issuance of any Advisory action in this application.

The Commissioner is hereby authorized to charge any deficiencies or credit
any overpayment to Deposit Order Account No. 11-0855.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Bruce D. Gray', written over a horizontal line.

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